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CAMBARUS (JUGICAMBARUS) SUBTERRANEUS, A NEW CAVE CRAYFISH (DECAPODA: CAMBARIDAE) FROM NORTHEASTERN OKLAHOMA, WITH A KEY TO THE TROGLOBITIC MEMBERS OF THE SUBGENUS *JUGICAMBARUS*

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Abstract.—*Cambarus* (*Jugicambarus*) *subterraneus,* a new albinistic, troglobitic, crayfish, is described from three cave stream habitats in Delaware County, northeastern Oklahoma. Its closest affinities are with four other troglobitic species occurring in the Ozarks, particularly with *C.* (*J.*) *aculabrum* and *C.* (*J.*) *setosus,* all of which are allopatric.

As early as 1951, a population of troglobitic crayfishes of the genus *Cambarus* had been known from a "Cave [=Twin Cave] between Spavinaw and Jay, Delaware Co.," Oklahoma (Hobbs & Barr 1960:27). This obligate cavernicole was tentatively identified by Hobbs & Barr (1960) as *Cambarus* (*Jugicambarus*) *setosus* Faxon (1889:237). They realized that it was not a typical population of individuals and that there were "reasons to question this [species] designation" (see also Hobbs et al. 1977). In May 1972 I collected a troglobitic Form I male from Twin Cave and also recognized that it exhibited atypical *setosus* features. Field investigations were conducted from September 1989 to spring 1992 by the Oklahoma Biological Survey (Mehlhop-Cifelli 1990, Vaughn & Certain 1992) which revealed two additional populations of this species in Jail and Star caves. Based on data from DNA analyses by Koppleman (1990) and on those of morphological investigations conducted by me on a limited number of available specimens, these populations are considered an undescribed species designated herein as *Cambarus* (*Jugicambarus*) *subterraneus.* This is the thirty-first troglobitic crayfish to be named from North America (north of Mexico); the second obligate cave crayfish to be discovered from Oklahoma; and the eleventh and sixth, respectively, of the genus *Cambarus* and of the subgenus *Jugicambarus,* known to be restricted to hypogean waters of the United States (Hobbs III 1993).

Cambarus (*Jugicambarus*) *subterraneus,* new species

Figs. 1, 2a, b, e, k, o, p, Table 1

Diagnosis.—Albinistic; eyes reduced, carapace subcylindrical. Body and pereiopods bearing conspicuous stiff setae. Rostrum broadest at base, with small marginal spines symmetrically to slightly asymmetrically situated, lacking median carina; rostrum reaching base of ultimate podomere of antennular peduncle (reaching proximal to ultimate podomere in small individuals). Carapace lacking cervical spines; postorbital ridges depressed and terminating cephalically in weak tubercles. Areola 12.2–18.7 times as long as broad and constituting 40.9–42.7% of total carapace length (47.6–49.8% of postorbital carapace length) and with 1 or 2 punctations in narrowest part. Antennal scale about 1.9 times longer than wide, broadest distal to midlength. Chela of first pereiopod with moderately inflated palm bearing 17–24 tubercles scattered in an irregular mesial arrangement of two

somewhat distinct rows; dorso-longitudinal ridges of fingers moderately well developed. Hooks on ischia of third pereiopods of males compressed, not reaching basioischial articulation, and not opposed by tubercles on basis. Caudomesial boss on coxae of fourth pereiopods. First pleopods of male symmetrical, not continguous at base, terminating in two parts (central projection and mesial process), both recurved at angles greater than 90°. Central projection moderately long and slender, corneous, and with well defined subapical notch; mesial process with broad base not greatly inflated and with distal third tapering and projecting 108–123° to shaft of pleopod; proximolateral lobe of gonopod not set off from shaft by groove. Annulus ventralis subsymmetrical in outline, caudal part slightly movable; cephalic half traversed by deep submedian longitudinal trough; sinus originating on right caudolateral side of trough, crossing median line, continuing to fossa, crossing median line, and ending on caudal wall of annulus.

Holotypic male, form I.—Cephalothorax subovate in cross section, markedly depressed (Fig. 1a, j). Abdomen narrower than thorax (9.7 and 12.5 mm in widest parts, respectively). Greatest width of carapace at slightly less than 0.2 length of areola from cephalic margin where width is greater than height (12.5 and 7.9 mm, respectively). Areola very narrow, 18.7 times as long as wide; length of areola 42.7% of entire length of carapace (49.8% of postorbital carapace length). Cephalic section of carapace 1.3 times as long as areola length. Rostrum with convergent margins, slightly thickened; small corneous asymmetrical marginal spines delimiting base of corneous up-turned acumen extending cephalic to basal part of ultimate podomere of antennular peduncle; dorsal surface of rostrum excavate and bearing few, small setiferous punctations. Subrostral ridges weakly developed and evident in dorsal aspect for only short distance at base of rostrum. Postorbital ridges short, lacking spines, terminating cephalically in very weak tubercles. Suborbital angle absent; branchiostegal spine small but acute. Cervical spines absent. Surface of carapace weakly punctate dorsally and granulate laterally.

Abdomen only slightly longer than carapace. Epimeron of first abdominal segment barely overlaped by that of second; pleura of fourth through fifth abdominal segments rounded anteroventrally, subangular posteroventrally. Cephalic section of telson with single fixed spine in each caudolateral corner, smaller spine immediately mesial to each and movable; mesial ramus of uropod with distolateral spine falling short of distal margin.

Anteromedian lobe of epistome (Fig. 1k) broader than long with cephalomedian depression, elevated (ventrally) margins with several distinct projections. Antennule of usual form with prominent submedian spine on ventral surface of basal segment distal to midlength. Antennae extending caudad well beyond caudal margin of telson. Antennal scale (Fig. 1i) 1.9 times as long as broad, greatest width distal to midlength with lamellate portion suddenly broadened in distal half; heavy lateral portion terminating cephalically in moderately long spine slightly overreaching tip of acumen.

Right chela (Fig. 1l) almost 4 times as long as wide, subovate in cross section and palm somewhat inflated. All surfaces with setiferous punctations bearing conspicuously-long setae. Inner margin of palm with about 24 tubercles arranged roughly in two staggered rows; ventral surface of palm with longitudinal row of widely spaced submedian tubercles increasing in size distally, two distalmost ones corneous; lateral margin with row of low tubercles along basal half, otherwise punctate. Fingers provided with moderately well defined ridges dorsally and ventrally. Opposable margin of fixed finger with row of 15 tubercles situated more densely in proximal fourth, those in distalmost segment corneous tipped; seventh tubercle from base largest; single longitudinal

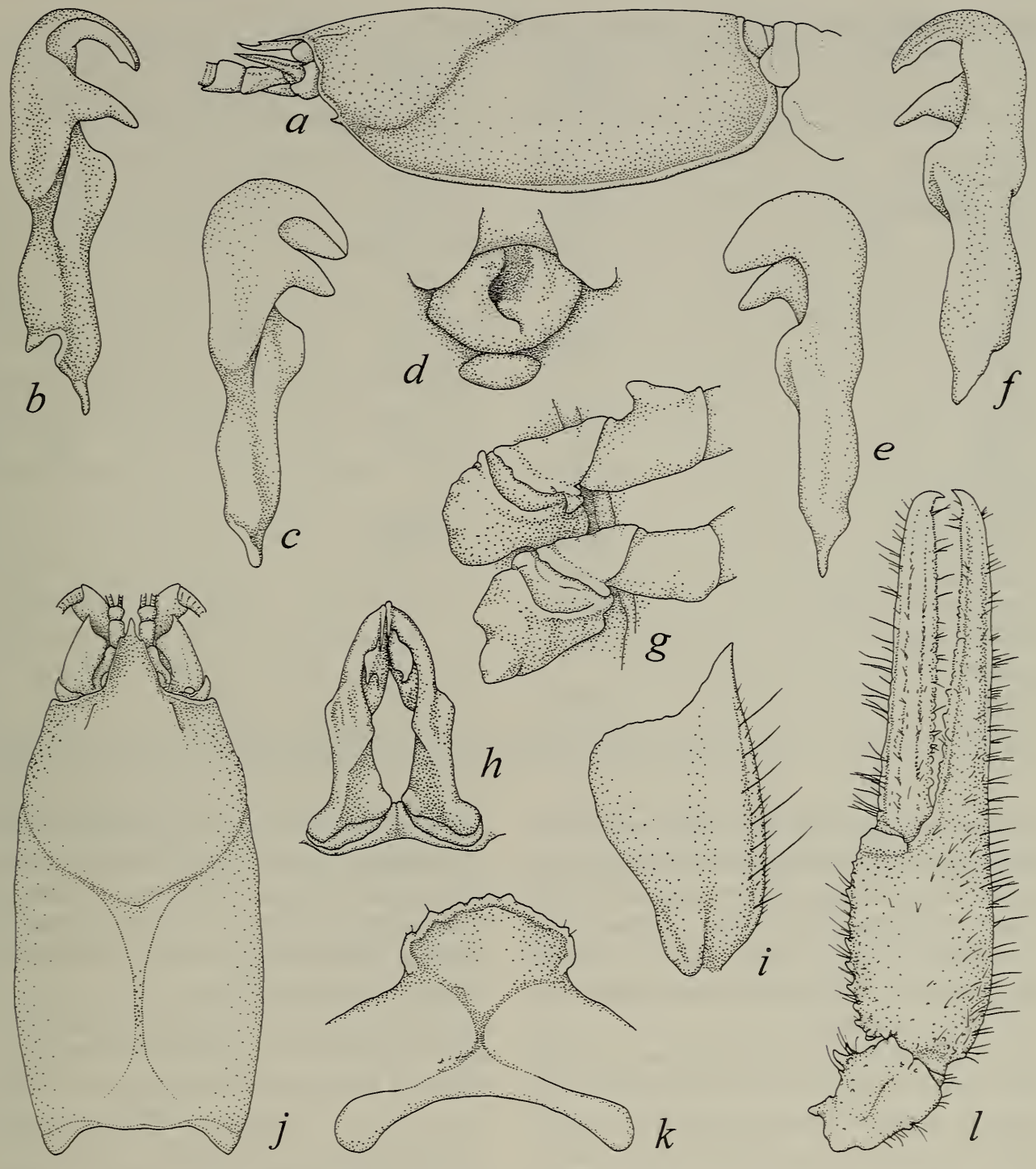

Fig. 1. *Cambarus* (*J.*) *subterraneus* (a, b, f–l from holotype; c, e from morphotype, and d from allotype): a, Lateral view of cephalothorax; b, c, Mesial view of first pleopod; d, Annulus ventralis; e, f, Lateral view of first pleopod; g, Ventral view of basal podomeres of third and fourth pereiopods; h, Caudal view of first pleopods; i, Right antennal scale; j, Dorsal view of carapace; k, Epistome; l, Dorsal view of distal podomeres of right cheliped.

row of minute denticles extending entire length of finger. Opposable margin of dactyl with single row of 17 tubercles along proximal four-fifths of finger, interspersed with single row of minute denticles; third tubercle from base largest.

Carpus (Fig. 1l) of right cheliped longer than broad with shallow longitudinal furrow on dorsal surface; with scattered setiferous punctations. Mesial surface with one large tubercle and smaller one ventromesially; smaller one distal to and another

Table 1.—Measurements (mm) of *Cambarus* (*Jugicambarus*) *subterraneus*, new species.

	Holotype ♂I Twin Cave	Morphotype ♂II Twin Cave	Paratype ♂I Twin Cave	Paratype ♂I Star Cave
Carapace				
Entire length	26.2	18.2	20.2	14.9
Postorbital length	22.5	15.7	17.3	12.8
Width	12.5	8.4	9.3	6.7
Height	7.9	5.9	6.4	4.5
Areola				
Width	0.6	0.9	0.5	0.5
Length	11.2	7.6	8.5	6.1
Rostrum				
Width	3.3	2.4	2.7	1.8
Length	3.6	2.9	2.6	2.2
Right chela				
Length, palm		(regen.)		
mesial margin	10.4	5.6	6.0	—
Palm width	7.4	3.2	4.0	—
Length, lateral margin	29.4	15.1	16.6	—
Dactyl length	18.2	8.9	9.7	—
Abdomen				
Width	9.8	7.1	7.3	5.0
Length	28.1	14.1	21.8	15.4

proximal to large tubercle; lower mesiodistal margin with prominent spike-like tubercle; lower laterodistal margin with two pronounced flat projections, mesialmost opposing articular knob on palm; several small tubercles arranged in arc proximal to laterodistal tubercle.

Merus of right cheliped with many small tubercles forming row on proximodorsal surface; lateral and mesial surfaces irregular with few small punctations and tubercles; lower mesial surface with row of 11 spike-like tubercles and lateral one of 7, distal two of which extending mesiodistally across distal part of podomere. Ischium with ventral row of two small tubercles; otherwise weakly punctate.

Hooks (Fig. 1g) on ischiopodites of third pereiopods only; hooks strong, simple, not reaching basioischial articulation and not opposed by tubercles on basis. Coxae of fourth pereiopods with moderately prominent, rounded caudomesial boss; coxae of fifth pereiopods with prominences.

First pleopods (Fig. 1b, f) symmetrical, not contiguous at base, barely reaching caudal portion of coxae of third pereiopods when abdomen flexed, and terminating in central projection and mesial process. See Diagnosis for description.

Allotypic female.—The only female specimen available (from Jail Cave) is badly distorted in preservation following a recent molt that occurred prior to capture and thus no description is attempted. The annulus ventralis (Fig. 1d) as described in "Diagnosis."

Morphotypic male, form II.—Differing from holotype in following respects: small corneous marginal spines of rostrum symmetrical; elevated margin of cephalic lobe of epistome with small median prominence, lateral ones very weak; inner margin of palm of left chela (both chelae regenerated but right particularly distorted) with 17 tubercles, proximal and distalmost ones spiniform; opposable margin of fixed finger with row of 12 corneous tubercles situated in

proximal two-thirds, absent from distal third, fifth tubercle from base largest; opposable margin of dactyl with sixth tubercle from base largest; lower mesial surface of merus with row of 14 spike-like tubercles and lateral row of 6. Hook on ischium of third pereiopod smaller but otherwise similar to that of holotype. First pleopod (Fig. 1c, e) with more robust terminal elements but both disposed similarly as in holotype.

Type locality.—Twin Cave, Delaware County, Oklahoma (Choleta Quadrangle, T. 23N, R. 22E), protected by The Nature Conservancy. This is a large solution cave in Mississippian limestone (Boone Formation—cherty limestone) with a recharge area of 6 km^2 (Aley & Aley 1990). *Cambarus* (*J.*) *subterraneus* occurs in the main pool, the visible portion is approximately 20 m in diameter with a maximum depth of 3–4 m. The substrate consists of clay covered with silt. This cave supports a diverse fauna (Black 1971) including a millipede, collembolan (*Folsomia candida* Willem), cricket (*Ceuthophilus utahensis* Thomas), dipteran, beetles (including *Scaphinotus elevatus*), a bullhead catfish, blind Ozark Cavefish (*Amblyopsis rosae* (Eigenmann)), Cave Salamander (*Eurycea lucifuga* Rafinesque), Grotto Salamander (*Typhlotriton spelaeus* Stejenger), Pickerel Frog (*Rana palustris* LeConte), two endangered bat species, *Myotis grisescens* Howell and *M. sodalis* Miller & Allen, and the Eastern Pipistrel Bat, *Pipistrellus subflavus* Cuvier.

Disposition of types.—The holotype, allotype, and morphotype are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., (USNM) USNM 260249, 260250, and 260251, respectively. Paratypes, consisting of 1 ♂ I from Twin Cave, 1 ♂ I from Star Cave, and 1 ♂ II from Jail Cave (see "Range"), are also deposited in the Smithsonian Institution.

Range.—This troglobitic crayfish is known from three caves in Delaware County, Oklahoma. In addition to the type locality, *C.* (*J.*) *subterraneus* is found in Jail and Star caves. In Jail Cave (Choleta Quadrangle, T. 23N, R. 22E) specimens were captured in a single, 5 m diameter, mud-bottomed pool of unknown depth. Recharge area for this cave is 3.9 km^2 (Aley & Aley 1990) and a stream is present but little of it can be accessed for sampling. Historically this privately owned cave was a maternity site for the Gray Bat (*Myotis grisescens*), and a diplopod, dipterans, *Amblyopsis rosae,* a salamander, and *Rana palustris* are known from this cave (see Black 1971). Star Cave (Jay Quadrangle, T. 23N, R. 23E) is a stream cave with six small pools in which crayfish have been observed. Cave passage width is generally 3–4 m and stream depth is rarely greater than 1 m, usually less than 25 cm; substrate is gravel and mud. The cave should be entered with extreme caution since loose rock slabs occur in the crawlways. Black (1971:28) listed *Typhlotriton spelaeus,* from this locality, and *Ceuthophilus utahensis,* a beetle (*Platynus* sp.), and *Amblyopsis rosae* have been observed.

Aley & Aley (1990) identified six potentially hazardous sites that would introduce contaminants into the groundwater system in the delineated recharge area for Twin Cave and five within the drainage basin for Jail Cave. They concluded that disposal of untreated animal wastes is probably the greatest single potential threat to aquatic life in these caves and recommended that management attention should be focused on efforts to minimize groundwater quality impacts, mainly from large hog farms and/or poultry houses.

Size.—The largest specimen is the holotype from Twin Cave, having a carapace length of 26.2 mm (postorbital carapace length 22.5 mm). The smallest first form male has a carapace length of 11.5 mm. Mehlhop-Cefelli (1990: table 2) presented measurements for individuals of this species that were captured and released from these three known localities. These data are summarized in Table 2.

Seasonal data.—First form males have been observed and/or collected from Twin

Table 2.—Measurements (mm) of *Cambarus* (*Jugicambarus*) *subterraneus*, new species, captured and released from the three Oklahoma caves from which it is known (data from Mehlhop-Cefelli 1990).

Cave	Sex	Carapace		Areola		Chela	
		Length	Width	Length	Width	Length	Width
Twin	♂I	16.3	9.4	7.8	2.1	7.4	3.8
	♂II	17.2	8.1	9.4	2.5	6.0	3.3
	♂II	18.1	6.9	9.1	1.2	4.7	2.6
	♀	14.0	6.0	7.4	1.4	—	—
	♀	15.4	6.4	8.0	1.3	6.0	2.3
	♀	15.6	7.9	10.4	3.6	5.7	2.8
	♀	16.3	7.1	8.6	1.2	6.0	2.9
	♀	18.3	6.9	9.5	2.0	5.3	1.5
	♀	19.5	9.4	10.1	2.8	8.1	4.2
	♀	20.5	8.0	10.2	2.2	6.0	4.6
	♀	25.1	10.5	11.1	3.2	11.3	5.5
Jail	♂I	11.5	5.2	5.2	1.0	4.5	2.4
	♂II	16.5	6.9	8.5	1.6	6.0	3.4
	♀	12.1	5.5	7.0	1.3	3.9	1.5
Star	♂I	18.6	7.3	8.0	1.4	4.9	2.2
	♂II	11.3	4.2	5.1	0.9	4.1	1.4
	♂II	14.1	6.4	6.7	1.1	3.4	1.2
	♂II	17.0	7.0	8.3	1.3	6.2	3.0
	♀	13.6	4.9	5.9	0.9	5.3	2.6
	♀	16.5	7.5	7.7	1.2	5.7	2.8
	♀	17.7	7.4	8.3	1.3	6.2	3.2
	♀	21.2	9.1	8.2	1.1	—	—
	♀	21.8	9.0	8.5	1.6	8.1	4.6
	♀	23.4	11.3	11.6	1.4	11.0	7.2
	♀	24.6	10.6	11.9	3.0	10.1	4.8

Cave on: 12 May 1972, 17 Aug 1975, 30 Sept 1989; and from Star Cave on 28 Oct 1989. Females with ova or young have not been observed.

Variations.—Individuals from the three caves examined are relatively similar in most morphological features. Perhaps the anteromedian lobe of the epistome (Figs. 1k, 2o, p) is the most variable structure, being unevenly and asymmetrically crenate but generally truncate, broader than long, and never in the form of an isosceles triangle as in *C.* (*J.*) *aculabrum* Hobbs & Brown (1987). The number of tubercles on several podomeres of the cheliped is variable as is the projected angle of the mesial process relative to the shaft of the appendage. Angle of projection of mesial process relative to shaft of first pleopod is variable. Without additional specimens from the three known localities, no attempt is made to assess morphological variations among populations.

Relationships.—The five troglobitic crayfishes known from the Ozark Region are probably more closely allied to one another than any one is to other hypogean or epigean species (see Hobbs & Brown 1987 for a discussion of the troglobitic members of the subgenus *Jugicambarus* and their possible origins).

Cambarus (*J.*) *subterraneus* differs from other troglobitic members of the subgenus from the Ozarks only in a combination of features. Clearly it demonstrates close affinities with *C.* (*J.*) *setosus* and *C.* (*J.*) *aculabrum* and is more distantly related to *C.* (*J.*) *tartarus* Hobbs & Cooper (1972) and *C.* (*J.*) *zophonastes* Hobbs & Bedinger (1964), yet

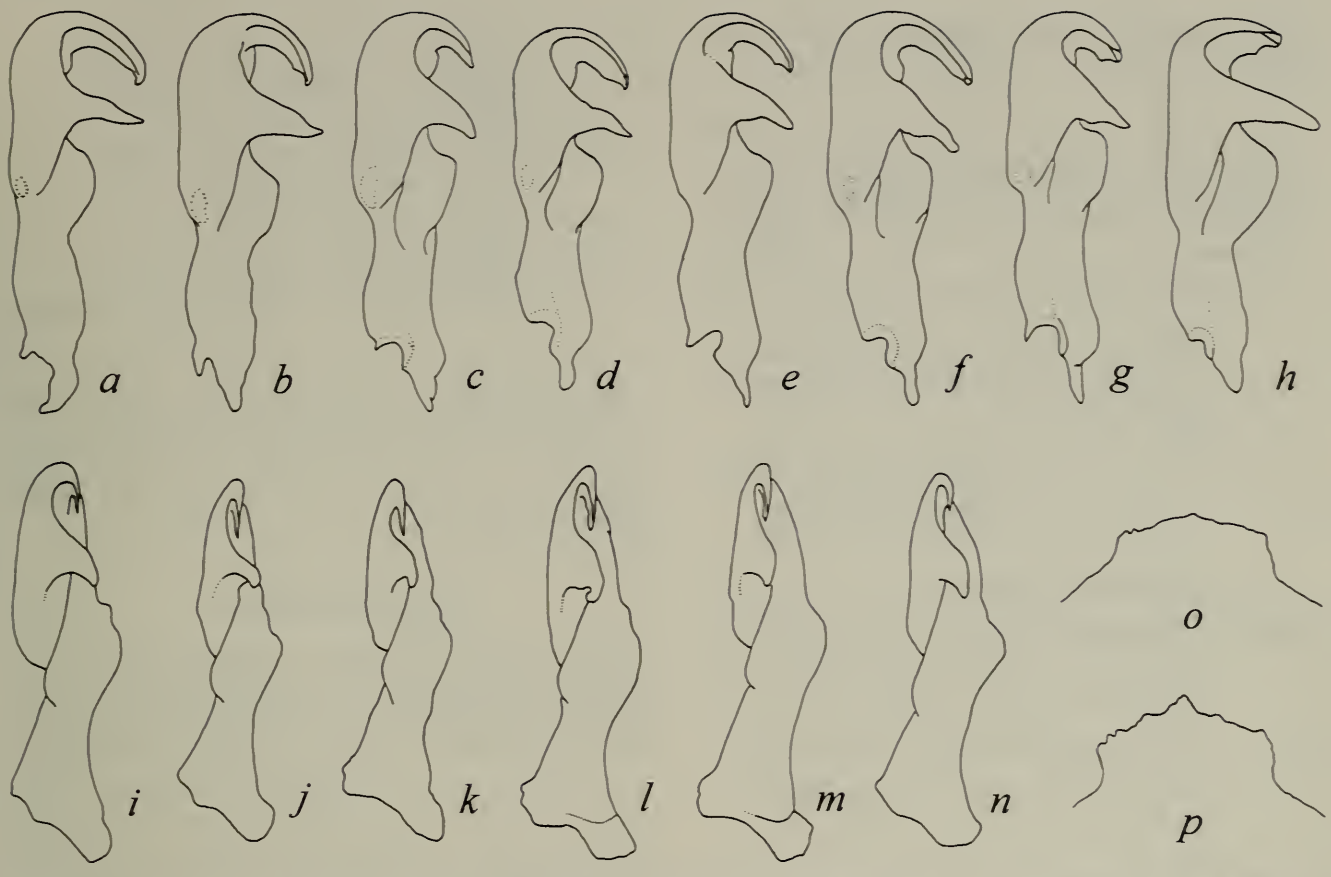

Fig. 2. Epistome and secondary sexual features of troglobitic species of subgenus *Jugicambarus* (a–h, Mesial view of first pleopod of male, Form I; i–n, Caudal view of first pleopod of male, Form I; o, p, Epistome): a, b, Paratypes of *C. (J.) subterraneus* from Star and Twin caves, respectively; c, i, Holotype of *C. (J.) zophonastes*; d, j, Holotype of *C. (J.) aculabrum*; e, k, Holotype of *C. (J.) subterraneus*; f, l, *C. (J.) setosus* from Smallins Cave; g, m, Holotype of *C. (J.) tartarus*; h, n, Holotype of *C. (J.) cryptodytes*; o, Morphotype of *C. (J.) subterraneus*; p, Paratype of *C. (J.) subterraneus* from Twin Cave (c, d, f–j, l–n after Hobbs & Brown 1987).

it shares morphological similarities with all species. As in *C. zophonastes* and *C. aculabrum,* the proximolateral lobe of the first pleopod is not set off from the main shaft by a transverse groove; however, the new species can be distinguished from the former by its shorter central projection and rostrum and from the latter by its slenderer central projection and more truncate epistome. As in *C. tartarus,* the central projection of the first pleopod bears a distinct subapical notch but lacks a transverse groove and the epistome has a less ornate anteromedian lobe. The epistome of *C. setosus* is similar to that of *C. subterraneus* yet the projections are more pronounced in *C. setosus*; also, *C. subterraneus* has a pronounced subapical notch on the distal end of the central projection but lacks a transverse groove on the first pleopod.

Results of electrophoretic analyses of troglobitic crayfishes from Arkansas, Missouri, and Oklahoma (Koppleman 1990, pers. comm.) demonstrate that the specimens from Jail, Star, and Twin caves in Delaware County, Oklahoma are genetically similar to *C. aculabrum* in Benton County, Arkansas. They are also genetically analogous to *C. setosus* from southwestern Missouri, yet these Delaware County populations are dissimilar enough to be considered a distinct species. Genetic similarities and differences are based on the use of Rogers (1972) distance measure.

The following key should be useful in identifying first form males of the six trog-

lobitic species of the subgenus *Jugicambarus*.

Key to the Troglobitic Members of the Subgenus *Jugicambarus* (Based on first pleopods of first form males—modified from Hobbs & Brown 1987)

1a. Central projection directed at right angle to shaft of pleopod (Fig. 2h, n) ..... *C.* (*J.*) *cryptodytes* Hobbs

1b. Central projection directed caudally more than 90° to shaft of pleopod (Fig. 2a–g) 2

2a(1b). Proximolateral lobe of shaft of pleopod set off from shaft by transverse groove (Fig. 2l, m) 3

2b. Proximolateral lobe of shaft of pleopod not set off from shaft by transverse groove (Fig. 2i–k) 4

3a(2a). Central projection short, heavy, not tapering, truncate apically (Fig. 2g, m) ..... *C.* (*J.*) *tartarus* Hobbs & Cooper

3b. Central projection moderately long and tapering somewhat to rounded apex (very shallow subapical notch rarely developed) (Fig. 2f, l) ..... *C.* (*J.*) *setosus* Faxon

4a(2b). Central projection short and lacking subapical notch (Fig. 2c, i) ..... *C.* (*J.*) *zophonastes* Hobbs & Bedinger

4b. Central projection moderately long bearing distinct subapical notch (Fig. 2a, b, d, e) 5

5a(4b). Central projection relatively heavy (Fig. 2d, j); anteromedian lobe of epistome in form of isosceles triangle and produced anteriorly in acute or subacute apex ..... *C.* (*J.*) *aculabrum* Hobbs & Brown

5b. Central projection relatively slender; anteromedian lobe of epistome generally truncate with several distinct projections, not triangulate, and rarely produced anteriorly in acute or subacute apex (Fig. 2a, b, k, o, p) ... *C.* (*J.*) *subterraneus*

Etymology.—*Cambarus* (*Jugicambarus*) *subterraneus* takes its name from the Latin *subter* (below, beneath), alluding to its spelean existence.

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Literature Cited

Aley, T., & C. Aley. 1990. Hydrogeology of Ozark cavefish caves in Oklahoma. Final Report to The Nature Conservancy. Ozark Underground Laboratory, Protem, 70 pp.

Black, J. H. 1971. The cave life of Oklahoma. A preliminary study (excluding Chiroptera).—Oklahoma Underground, Central Oklahoma Grotto 4(1, 2):2–53, 25 text fig., 8 figs.

Faxon, W. 1889. *Cambarus setosus* Faxon. *In* Samuel Garman, Cave animals from southwestern Missouri.—Bulletin of the Museum of Comparative Zoology at Harvard College 17(6):237, pl. 1:figs. 1–3; pl. 2: fig. 1.

Hobbs, H. H., Jr., & T. C. Barr, Jr. 1960. The origins and affinities of the troglobitic crayfishes of North America (Decapoda, Astacidae), I: The genus *Cambarus*.—American Midland Naturalist 64: 12–33.

———, & M. S. Bedinger. 1964. A new troglobitic crayfish of the genus *Cambarus* (Decapoda, Astacidae) from Arkansas with a note on the range of *Cambarus cryptodytes* Hobbs.—Proceedings

of the Biological Society of Washington 77(3): 9–15.

———, & A. V. Brown. 1987. A new troglobitic crayfish from northwestern Arkansas (Decapoda: Cambaridae).—Proceedings of the Biological Society of Washington 100:1040–1048.

———, & M. R. Cooper. 1972. A new troglobitic crayfish from Oklahoma (Decapoda: Astacidae).—Proceedings of the Biological Society of Washington 85(3):49–56.

———, H. H. Hobbs III, & M. A. Daniel. 1977. A review of the troglobitic crustaceans of the Americas.—Smithsonian Contributions to Zoology 244:v + 183 pp.

Hobbs, III, H. H. 1993. Biogeography of subterranean decapods in North and Central America and the Caribbean region (Caridea, Astacidea, Brachyura).—Hydrobiologia (in press).

Koppleman, J. B. 1990. A biochemical genetic analysis of troglobitic crayfish (*Cambarus* spp.) in Missouri, Oklahoma, and Arkansas.—Report for the Missouri Department of Conservation, Oklahoma Natural Heritage Inventory, and Arkansas Game and Fish Commission. Missouri Department of Conservation, Columbia, 13 pp.

Mehlhop-Cifelli, P. 1990. A survey and species determinations of cave crayfish (*Cambarus* spp.) in Oklahoma.—Report for the Oklahoma Department of Wildlife Conservation, Norman, 68 pp.

Rogers, J. S. 1972. Measures of genetic similarity and genetic distance.—Studies in Genetics, University of Texas Publication 7213:145–153.

Vaughn, C. C., & D. L. Certain. 1992. Survey and species determination of cave crayfish (*Cambarus* spp.) in Oklahoma.—Final report for the Oklahoma Department of Wildlife Conservation, Norman, 8 pp.

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